大连中比动力电池有限公司
DALIAN CBAK POWER BATTERY CO., LTD

锂离子电芯规格书

Specification for Lithium-ion Rechargeable Cell

电芯型号: 26650FS4B

Cell Type: 26650FS4B

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Contents 目录

1. Preface 前言

This Product Specification describes the technique requirements, test procedures and precaution notes of cylindrical type Lithium-ion Rechargeable cell to be supplied to customer by DALIAN CBAK POWER BATTERY COMPANY LIMITED.
本标准规定了由大连中比动力电池有限公司生产的锂离子电芯的技术要求、测试方法和注意事项。

2. Description 说明

2.1. Product 产品: Lithium-ion Rechargeable cell 锂离子可充性电芯

2.2. Model (Type) 电芯型号: 26650FS4B

2.3. Designation 名称:

26	650	F	S4	B
①	②	③	④	⑤

①: Indicates the diameter of cell 代表电芯直径

②: Indicates the overall height of cell 代表电芯高度

③: Indicates the property of the cell 代表电池性能
The letter "F" defines LiFePO4 series cathode
"F"代表以 LiFePO4 为正极材料体系

④: Indicates the property of the cell 代表电池性能
The letter "S" defines steel can cell
"S"代表钢壳电池
The number"4" defines fourth generation of production
"4"代表第四代产品

⑤: Indicates the cell for bicycle
"B"代表自行车用电池

3. Cell Size 电芯尺寸

For details, please refer to Figure A. Remark: contain PET cover
对于电池结构的详细资讯，请参阅图 A。备注：包含热缩套

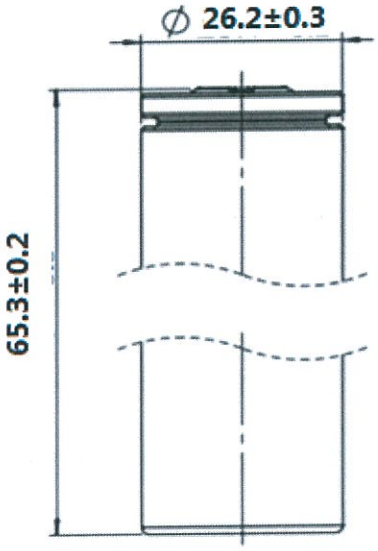


Figure A

4. Construction 电芯结构

A cell is made of cathode, anode, separator, steel can and caps.
电芯由正极、负极、隔膜、钢壳和盖板组成。

5. Specification 标准

Fresh cell, all tests stated in this Specification is Standard Test Conditions.
样品为新电池，无特别要求，此规格书上的产品测试条件均为标准测试条件。

Item 项目		Specification 标准	Remark 备注
Typical Capacity 典型容量		4000mAh	0.5C discharge capacity
Minimum Capacity 最小容量		3900mAh	
Internal Impedance 交流内阻		≤20mΩ	By AC 1 kHz
Nominal Voltage 标称电压		3.20 V	
Cell Weight 电芯重量		87.0±3.0g	contain package 包含外包装
Energy Density 能量密度		147Wh/kg	
End-of-charge Voltage 充电截止电压		3.6V	At CC mode 恒流制式
End-of-discharge Voltage 放电截止电压		2.0V	At CC mode 恒流制式
Standard Charging 标准充电制式		0.5C CC/CV, cut off 0.01C 0.5C 恒流恒压充电至 3.6V，0.01C 截止	180min
Standard Discharging 标准放电制式		0.5C CC, cut off 2.0V 0.5C 恒流放电至 2.0V 截止	
Max Continuous Charge 最大持续充电		0.2C	0~10℃
		0.5C	10~20℃
		1C	20~45℃
Max Continuous Discharge 最大持续放电		3C	Not for cycle
Cycle Life 循环性能		≥2000 cycles	+0.5C/-0.5C，25±2℃ capacity retention: ≥80%
Operating Temperature Range 操作温度范围	Charging Temperature 充电温度	0~45℃	
	Discharging Temperature 放电温度	-20~60℃	
	Storage Temperature 存储温度	-20～45℃	3month（3 个月）
		-10～25℃	6month（6 个月）
Shelf Life 保质期		1year 1 年	
Appearance 外观		Without break, scratch, distortion, contamination, leakage and so on 无破裂、划痕、变形、污迹、电解液泄露等	

6. Test Conditions 测试条件

6.1. Standard Test Conditions 标准测试条件

Unless otherwise specified, all tests stated in this Specification are conducted at temp. 25±2℃ and humidity 15-90％RH

若无特别要求，此规格书上的产品测试条件均为温度：25±2℃，湿度：15-90％RH

6.2. Standard Charge and Discharge Method 标准充放电制式

The "Standard Charge" means charging the Cell at a constant current of 0.5C until the voltage is 3.6V, then charged at a constant voltage of 3.6V until its current is less than 0.01C.

“标准充电制式”即以恒定电流 0.5C 充电至 3.6V，再以 3.6V 的恒压充电至电流小于 0.01C。

The "Standard Discharge" means discharging the Cell at a constant current of 0.5C until the voltage is 2.0V

“标准放电制式”即以恒定电流 0.5C 放电至 2.0V。

7. Electrical Characteristics 电性能

Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
1) High Temperature Performance 高温性能	A cell is charged in accordance with Standard Charge, and stored in an ambient temp. of 55±2℃ for 4hrs, then discharged at 1C to 2.0V. After that, fetch out the cell and place it in Standard Test Conditions for 4hrs, then check its appearance. 电芯按标准充电制式充电结束后，放入 55±2℃的高温箱中恒温 4hrs，然后以 1C 放电至 2.0V，将电芯取出在标准测试条件下搁置 4hrs，然后目测电芯外观。	1. Capacity≥95%; 2. No distortion, no rupture. 1. 放电容量≥95%; 2. 电芯外观无变形，无爆裂。
2) Low Temperature Performance 低温性能	A cell is charged in accordance with Standard Charge, and stored in an ambient temp. of -20±2℃ for 16hrs, then discharged to cut-off voltage at a constant current of 1C. After that, fetch out the cell and place it in Standard Test Conditions for 4hrs, then check its appearance. 电芯按标准充电制式充电结束后，将电芯放入-20℃±2℃的低温箱中恒温 16hrs，然后以 1C 电流放电至终止电压，实验结束后，将电芯取出在标准测试条件下搁置 4hrs，然后目测电芯外观。	1. Capacity≥70% 2. No distortion, no rupture 1. 放电容量≥70%; 2. 电芯外观无变形，无爆裂。
3) C-Rate Performance 倍率性能	A cell is charged in accordance with Standard Charge, after that stored for 60min, then discharged to cut-off voltage at a constant current of 0.5C, after that, stored 60min; then the cell is charged and discharge as above except that at a discharged constant current of 1C; then the cell is charged and discharge as above except that at a discharged constant current of 2C; then the cell is charged and discharge as above except that at a discharged constant current of 3C. 电芯按标准充电制式充电结束后搁置 60min，然后以 0.5C 恒流放电，放电结束后搁置 60min；这颗电芯继续进行下一次充放电循环，需 1C 进行恒流放电；继续进行下一次充放电循环，需以 2C 进行恒流放电；进行下一次充放电循环，需以 3C 进行恒流放电.	1C Capacity/0.5C Capacity ≥97%; 2C Capacity/0.5C Capacity ≥96%; 3C Capacity/0.5C Capacity ≥95%; 1C /0.5C 放电容量≥97%; 2C /0.5C 放电容量≥96%; 3C /0.5C 放电容量≥95%;

4) Capacity Retention and recovery 荷电保持和恢复性能	A cell is charged in accordance with Standard Charge, and stored in 55±2℃ for 7d, after that stored for 5hrs at room temperature, then discharged in accordance with Standard Discharging. After that, stored 10min the cell is charged in accordance with Standard Charge, after that stored for 10min, then discharged in accordance with Standard Discharging. 电芯按标准充电制式充电结束后，将电芯在 55±2℃搁置 7 天，然后在室温下搁置 5 小时，再以标准放电制式放电。放电结束后搁置 10min，此电芯标准充电制式充电结束后，搁置 10min，然后以标准放电制式放电。	Capacity retention: ≥ 90% Capacity recovery: ≥ 95% 容量保持率：≥90% 容量恢复率：≥95%
	A cell is charged in accordance with Standard Charge, and stored in Standard Test Conditions for 28d, then discharged in accordance with Standard Discharging. After that, stored 10min the cell is charged in accordance with Standard Charge, after that stored for 10min, then discharged in accordance with Standard Discharging. 电芯按标准充电制式充电结束后，在标准测试条件下，将电芯搁置 28 天，再以标准放电制式放电。放电结束后搁置 10min，此电芯标准充电制式充电结束后，搁置 10min，然后以标准放电制式放电。	Capacity retention: ≥90% Capacity recovery: ≥95% 容量保持率：≥90% 容量恢复率：≥95%
5) Cycle Life 循环寿命 (25℃±2℃)	A cell is charged at a constant current of 0.5C until the voltage is 3.6V, then charged at a constant voltage of 3.6V until its current is less than 0.05C, after that stored for 15min; then discharged at a constant current of 0.5C until the voltage is 2.0V, after that, stored 30min prior to next charge-discharge cycle. The cell shall be continuously charged and discharged for 2000 times. The residual capacity shall be measured in accordance with Typical Capacity. 电芯以 0.5C 恒流充电至 3.6V，以 3.6V 恒压充电至电流小于 0.05C，结束后搁置 15min，然后以 0.5C 恒流放电至 2.0V，放电结束后搁置 30min，再进行下一次充放电循环，连续进行充放电循环 2000 次。以典型容量测试方法复测容量。	capacity retention: ≥80% 容量保持率：≥80%

8. Safety Characteristics 安全性能

All below tests are carried out on the equipment with forced ventilation and explosion-proof device. Before test, all cells are charged in accordance with Standard Charge, and stored 1hrs prior to testing.
下述试验应在有强制排风条件及防爆措施的装置内进行，在试验前所有的电芯都按标准充电制式充电，并搁置 1hrs 后，再进行以下试验。

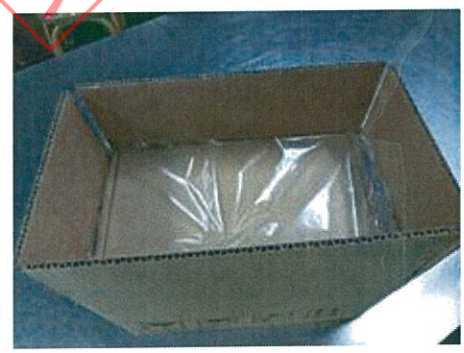
Test Item 测试项目	Test Method 测试方法	Criteria 检验标准
1) Temperature Test 温度循环	A cell is charged in accordance with Standard Charge, heated the cell to be in an oven. In 60min, the temperature of the oven is to be dropped to the temperature of -40℃ and remain for 90min at -40±3℃; In 60min, the temperature of the oven is to be raised to the temperature of 25℃; In 90min, the temperature of the oven is to be raised to the temperature of 85℃ and remain for 4hrs at 85±3℃; In 70min, the temperature of the oven is to be dropped to the temperature of 25℃; repeat this for another 5 cycles, after that put the cell in room temperature for at least 24hrs, then check cell's appearance. 电芯按标准充电制式充电结束后，将电芯放入温控箱内， 在 60 分钟内，温控箱温度降至-40℃，并在-40±3℃温度下保持 90min， 在 60 分钟内，温控箱温度升至 25℃， 在 90 分钟内，温控箱温度升至 85℃，并在 85±3℃温度下保持 110min， 在 70 分钟内，温控箱温度降至 25℃， 重复以上步骤 5 次，将电池保持在室温环境下 24 小时，目测电芯外观。	No leakage, no fire, no explosion, no vent. 电芯应不漏液、不起火、不爆炸、不裂开。
2) Low-pressure Test 低压测试	A cell is charged in accordance with Standard Charge, then stored it for 6hrs at an absolute pressure of 11.6kPa, after that put the cell in room temperature for 6hrs, then check cell's appearance. 电芯按标准充电制式充电结束后，将电芯放入在绝对压力为 11.6KPa 下搁置 6 小时，将电芯取出在室温下搁置 6 小时，目测电芯外观。	No leakage, no fire, no explosion, no vent. 电芯应不漏液、不起火、不爆炸、不裂开。
3) Drop Test 跌落测试	A cell is charged in accordance with Standard Charge, then dropped the cell from a height of 1500mm to the concrete ground with positive and negative terminals downward, then observed the cell for 1h. 电芯按标准充电制式充电结束后，将电芯样品的正负极端子向下由高度为 1500mm 的位置自由跌落到水泥地面上，观察 1 小时。	No leakage, no fire, no explosion. 电芯应不漏液、不起火、不爆炸。
4) Overcharge Test 过充电	A cell is charged in accordance with Standard Charge, then charged the cell up to 5.4V at CC of 1C or until that last 1h, then observed the cell for 1h. 电芯按标准充电制式充电结束后，对电池芯以 1C 恒流充电至 5.4V 或充电时间达到 1h 后停止充电，观察 1 小时。	No fire, no explosion. 电芯不起火，不爆炸。

5) Forced-Discharge Test 过放电	A cell is charged in accordance with Standard Charge, then discharged to at a constant current of 1C for 90min, then observed the cell for 1h. 电芯按标准充电制式充电结束后，以 1C 电流放电 90min，观察 1 小时。	No fire, no explosion. 电芯不起火，不爆炸。
6） Short-circuit Test 短路测试	The temperature of the oven is 20±5℃. A cell is to be placed into the oven and remain for 4 hours. Then the Cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a resistance load of 80±20mΩ. Monitor its temperature while testing, the cell is to be discharged until the cell case temperature has returned to be 20±10℃ or the voltage of the cell reaches 0.2V. 将试验箱设置到 20±5℃，将接有热电偶的电芯置于箱中,电芯在高温试中保持 4 小时。用铜线短路其正负极(线路总电阻 80±20 毫欧).实验过程中监视电芯温度变化，当电芯温度下降到 20±10℃或者电芯电压降到 0.2V 以下时，结束实验。	No fire, no explosion 电芯不起火，不爆炸
7) Heating Test 加热测试	A cell is charged in accordance with Standard Charge, and to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of 5±2℃ per minute to a temperature of 130±2℃ and remain for 30min, then observed the cell for 1h. 将电芯放在电热鼓风干燥箱中，温度以 5±2℃/min 的速率由室温升至 130±2℃并保持 30min，观察 1 小时。	No fire, no explosion. 电芯不起火，不爆炸。
8） Crush Test 挤压测试	A cell is to be placed on the crush flat, the axis is parallel to the crush flat, it is to be crushed between two flat surfaces. Crushing force is approximately 13 KN and hold for 1 min. 电芯放在挤压设备的两个挤压表面之间，圆柱电芯芯轴平行于挤压平面，逐渐增加压力至 13 KN，保持压力 1min。	No fire, no explosion 电芯不起火，不爆炸
9） Vibration Test 振动测试	A cell is charged in accordance with Standard Charge, then installed onto the vibration desk with clamps. Equipment parameters of frequency and amplitude are as follows (the frequency is to be varied at the rate of 1oct/min between 10 and 55 hertz, and repeat vibration for 90-100min, amplitude: 0.8mm. The cell is to be tested in three mutually perpendicular directions).Rest 1h, then check cell's appearance, and discharged at 0.5C to 2.8V. 电芯按标准充电制式充电结束后，将电芯用夹具安装在振动台的台面上，按下面的振动频率和对应的振幅调整好实验设备。X、Y、Z 三个方向每个方向上从 10～55Hz 循环扫频振动 90-100min，扫频速率为 1oct/min，位移幅值(单振幅)：0.8mm. 搁置 1h，目视电芯外观，并以 0.5C 放电至 2.0V。	No scratch, no leakage, no fire, no explosion, no vent; Capacity≥95% 电芯外观应无明显损伤、不漏液、不起火、不爆炸、不裂开，放电容量≥95%

10） Impact Test 重物冲击	A cell is to be placed on the impact flat. A Φ15.8mm bar is to be placed on the center of the cell. A 9.1kg weight is to be dropped from a height of 610mm onto the cell, the distortion is allowed. 将电芯放在冲击台上，将一 Φ15.8mm 的钢柱置放电池中心，钢柱的纵轴平行于平面，让重量 9.1kg 重锤自 610mm 高度自由落下，冲击电芯，电芯允许发生变形。	No fire, no explosion 电芯不起火，不爆炸
11） Shock Test 机械冲击	A cell is charged in accordance with Standard Charge, the cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of two mutually perpendicular directions. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3 ms the minimum average acceleration is 75 g. The peak acceleration shall be between 125 and 175 g. 电芯按标准充电制式充电结束后，用刚性固定的方法将电芯固定在设备上，该方法能固定电芯的所有表面。电芯在两个相互垂直的方向上承受三次等值的冲击，每次冲击都沿着电芯表面的法线方向施加。每次冲击在最初的 3ms 内，最小平均加速度为 75g，峰值加速度在 125g 和 175g 之间。	No leakage, no fire, no explosion. 电芯应不漏液、不起火、不爆炸。

9. Package Picture 包装图片

Small box



Big box

Pallet

（40pcs cells in a small box, 2 small boxes in a big box）
（每小盒内 40 颗电芯，每大盒内两小盒）

10. Shipment 出货

The Cell shall be shipped in 20-30% state of charge (SOC) or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.
单体电芯按 20-30%的充电容量或客户要求出货，电芯出货后充电前的剩余容量取决于储存时间和条件。

11. Warranty 质量保证

The Warranty period of cell is made according to business contract, However, even though the problem occurs within this

period, DALIAN CBAK POWER BATTERY COMPANY LIMITED won't replace a new cell for free as long as the problem is not due to the failure of DALIAN CBAK POWER BATTERY COMPANY LIMITED manufacturing process or is due to customer's abuse or misuse.

自出货之日起，电芯的保质期限依合同而定。但是，在此期限内，如果不是大连中比动力电池有限公司的制程原因而是客户的误用造成的电芯质量问题，大连中比动力电池有限公司不承诺免费更换。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will not be responsible for trouble occurred by handling outside of the precautions in instructions.

大连中比动力电池有限公司对违反安全守则操作所产生的问题不承担任何责任。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will not be responsible for trouble occurred by matching electric circuit, cell pack and charger.

大连中比动力电池有限公司对与电路、电池组、充电器搭配使用所产生的问题不承担任何责任。

DALIAN CBAK POWER BATTERY COMPANY LIMITED will be exempt from warrantee any defect cells during assembling after acceptance.

出货后客户在电芯组装过程中产生的不良电芯不在大连中比动力电池有限公司质量保证的范围之列。

12. Precautions and Safety Instructions 安全守则

Lithium-Ion rechargeable batteries subject to abusive conditions can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before using utilization.

滥用锂离子充电电芯可能会造成电芯损害或人身伤害，在使用以前，请仔细阅读以下的安全守则：

Note 1. The customer is required to contact DALIAN CBAK POWER BATTERY COMPANY LIMITED in advance, if and when the customer needs other applications or operating conditions than those described in this document.

注释 1、如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询大连中比动力电池有限公司相关事宜。

Note 2. DALIAN CBAK POWER BATTERY COMPANY LIMITED will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

注释 2、在该文件说明的条件之外使用该电芯而产生的事故，大连中比动力电池有限公司不承担任何责任。

12.1. Standard cell Precautions 电芯防范措施

a) Do not throw the Battery cell into fire or heat it.
不要将电芯投入火中或加热。

b) Do not short circuit, over-charge or over-discharge the cell.
不要将电芯短路，过充或过放。

c) Do not subject the cell to strong mechanical shocks.
不要使电芯承受过重的机械冲击。

d) Do not immerse the cell in water or sea water, or get it wet.
不要将电芯浸入海水或水中，或者使其吸湿。

e) Do not reverse the polarity of the cell for any reason.
不要颠倒电芯的正负极。

f) Do not disassemble or modify the cell.
不要拆卸或修整电芯。

g) Do not handle or store with metallic like necklaces, coins or hairpins, etc.
不要和项链，硬币或发夹等金属物品放置在一起。

h) Do not use the cell with conspicuous damage or deformation.

不要使电芯受到明显的损害或变形。

i) Do not connect cell to the plug socket or car-cigarette-plug.
不要将电芯与插座连接。

j) Do not touch a leaked cell directly.
不要直接接触泄漏的电芯。

k) Do not use Lithium-ion cell in mixture.
不要将锂离子电芯混合使用。

l) Do not use or leave the cell under the blazing sun (or in heated car by sunshine).
不要将电芯放置在太阳光直射的地方。

m) Keep cell away from children.
将电芯放置在远离儿童的地方。

n) Do not drive a nail into the cell, strike it by hammer or tread it.
不要针刺，锤打或践踏电芯。

o) Do not give cell impact or fling it.
不要撞击或投掷电芯。

p) Do not put Battery Cell into microwave oven or high pressure container.
不要将电芯放入微波炉或高压容器中。

12.2 Cell Operation Instructions 电芯使用说明

12.2.1 Charging 充电

a) When the Battery Cell is charged, the specified charge method and current described in this PS-Document should apply. If charge current exceeds the upper limit of the specified range, characteristics and safety of the Battery Cell could be deteriorated, or it may cause heat, explosion and fire.
应遵守本规格书的充电方式。如果超过电流上限，电池的安全性将不能被保证，会引起发热，爆炸，起火。

b) Charge voltage should not exceed 3.65V.
充电电压不能超过 3.65V。

c) Charge the cell in a temperature range of 0°C to + 45°C.
电芯充电温度范围为 0℃～45℃。

d) Use a constant current, constant voltage (CC/CV) lithium-ion (Li+) cell charge controller.
使用恒流恒压锂离子电芯充电器。

12.2.2 Discharging 放电

a) The discharge current should not exceed the designated current described in this PS-Document. If the discharge current exceeds the specified value, discharge capacity could be extremely deteriorated or the Cell could be heated
放电电流不能超过本规格书的规定值，如果电流超过了规定值，电池容量将被破坏或者电池会出现发热情况。

b) For maximum performance, discharge the cell in a temperature range of –20°C to + 60°C.
为了达到较好的性能，电芯的放电温度范围为–20℃～+ 60℃。

12.2.3 Storage Recommendations 储存建议

a) Do not store the Battery Cell together with combustibles.
不要将电池和易燃物一起存放。

b) In case of long period storage (more than 3 months), storage the cell at temperature range of –10 ~ 25°C, low humidity, no corrosive gas atmosphere, and recommend to charge/discharge once every 3 months, and the SOC remains between 25-75%.
如果要长时间存放(超过 3 个月)，电芯应存储在温度范围为 - 10～25℃，低湿度和不含腐蚀性气体的环境中，建议每隔 3 个月充放电一次，SOC 保持在 25-75%之间。

c) No press on the cell
不要让电芯承受任何压力。

13. Consultation 技术咨询

As to the obscurity, contact the following.
Address: No.11 East Meigui Road, Huayuankou Economic District, Dalian
Tel No.: +86—411—39185990 Fax No.: +86—411—39185980
如有疑问，请按以下方式咨询
厂址：大连花园口经济开发区玫瑰街东段 11 号
电话号码：+86—411—39185990 传真号码：+86—411—39185980
http://www.cbak.com.cn

14. Requirement for Safety Assurance 安全保证要求

For the sake of safety assurance, please discuss the equipment design, its system and protection circuit of Lithium-ion cell with DALIAN CBAK POWER BATTERY COMPANY LIMITED in advance. And consult about the high rate current, rapid charge and special application in the same way.
为了安全起见，如有设备设计，锂离子电芯系统保护电路或高电流，快速充电和其它方面的特殊应用，请先咨询大连中比动力电池有限公司相关事宜。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